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(54) Method of sterilising liquid dispenser

(57) A method of sterilising cooled water held in a cooler (1) having a cooling chamber (3) with a tap (8) through which cooled water may be dispensed. A lamp assembly (9) has an ultra violet light emitting bulb (10) which kills bacteria or micro-organisms onto which it is shone. The lamp assembly (9) therefore sterilises any water contained within the cooling chamber (3). The sterilising of the liquid in the cooling chamber (3) eliminates recontamination of the liquid after sterilisation and prior to its dispensing.

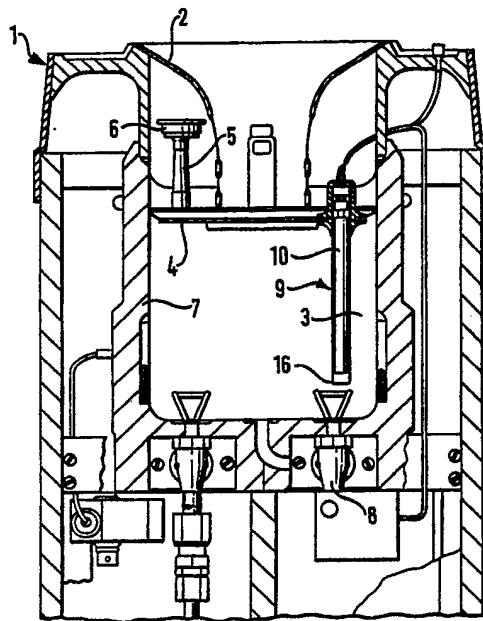


FIG.1

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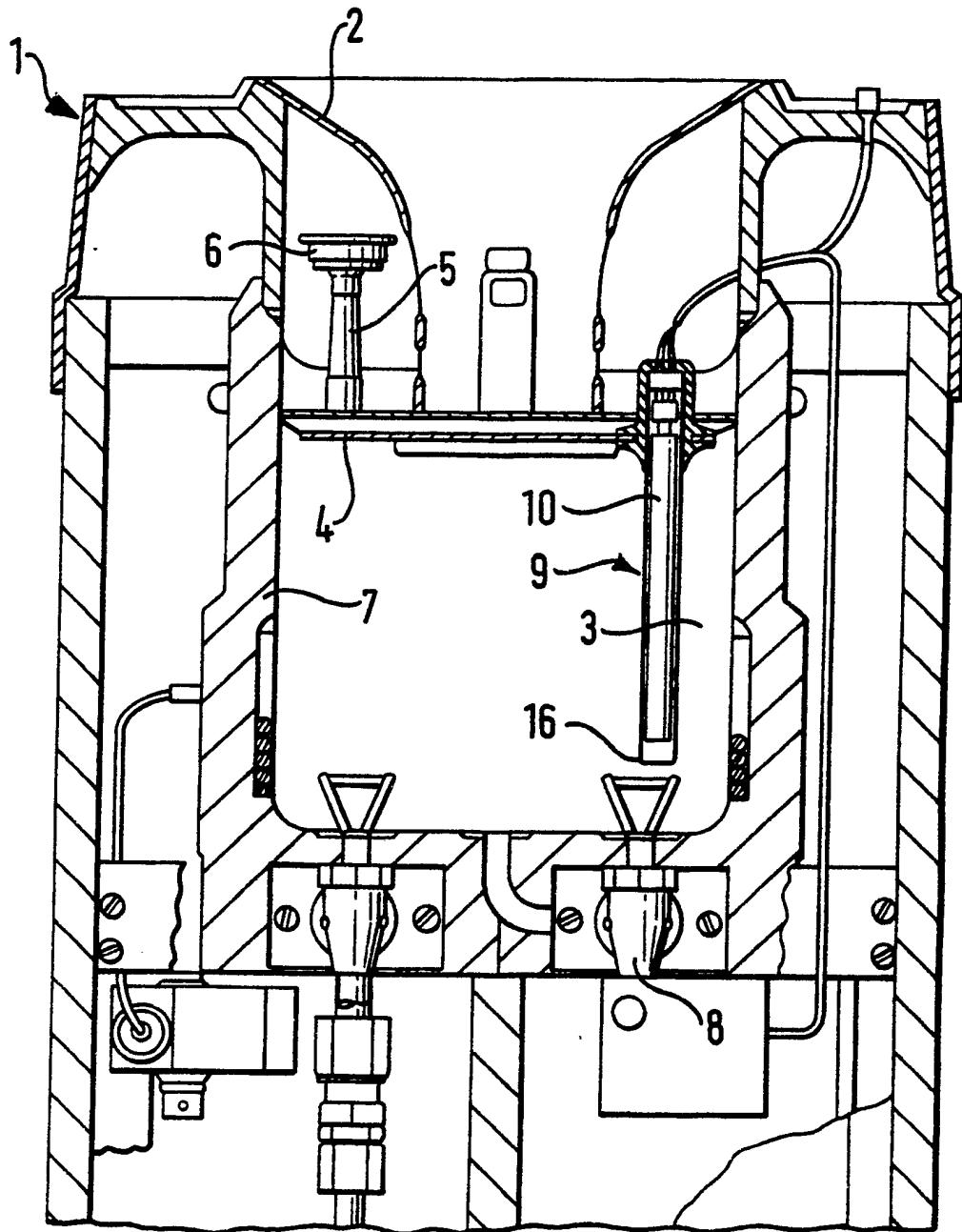


FIG.1

2/3

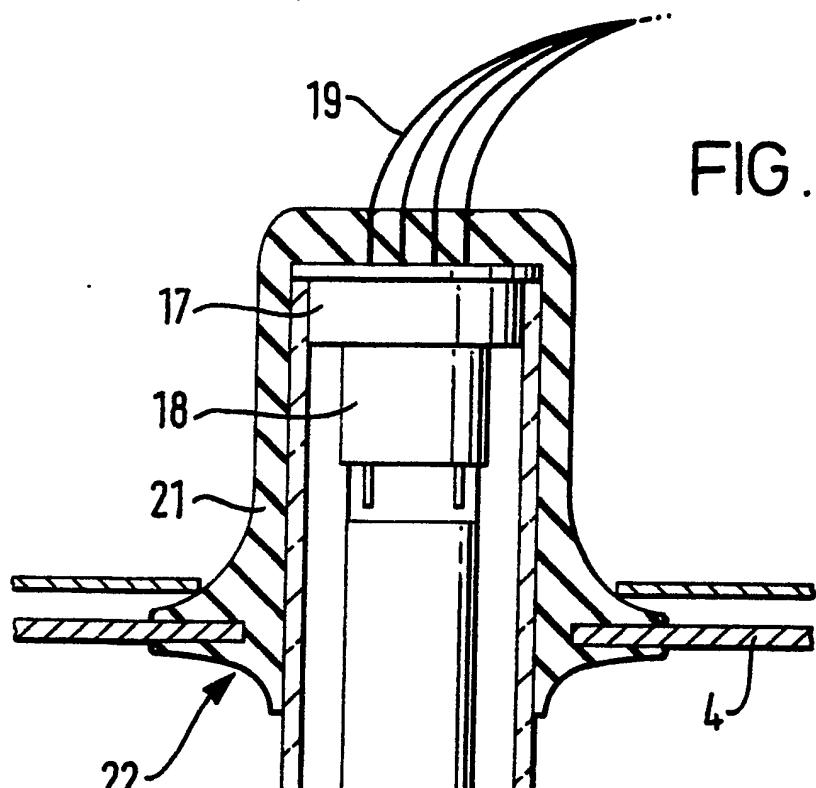
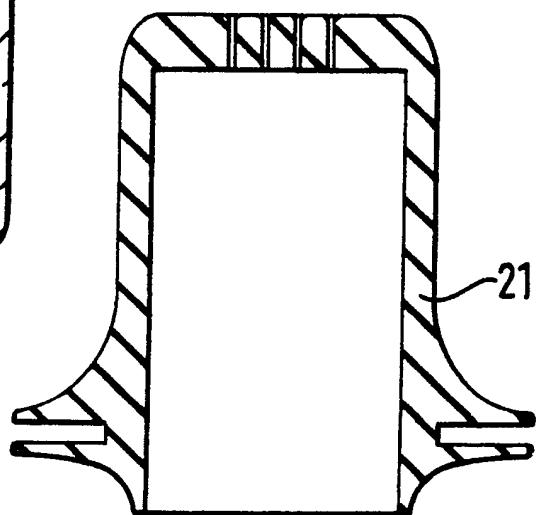


FIG. 2

10
15

FIG. 3



3 / 3

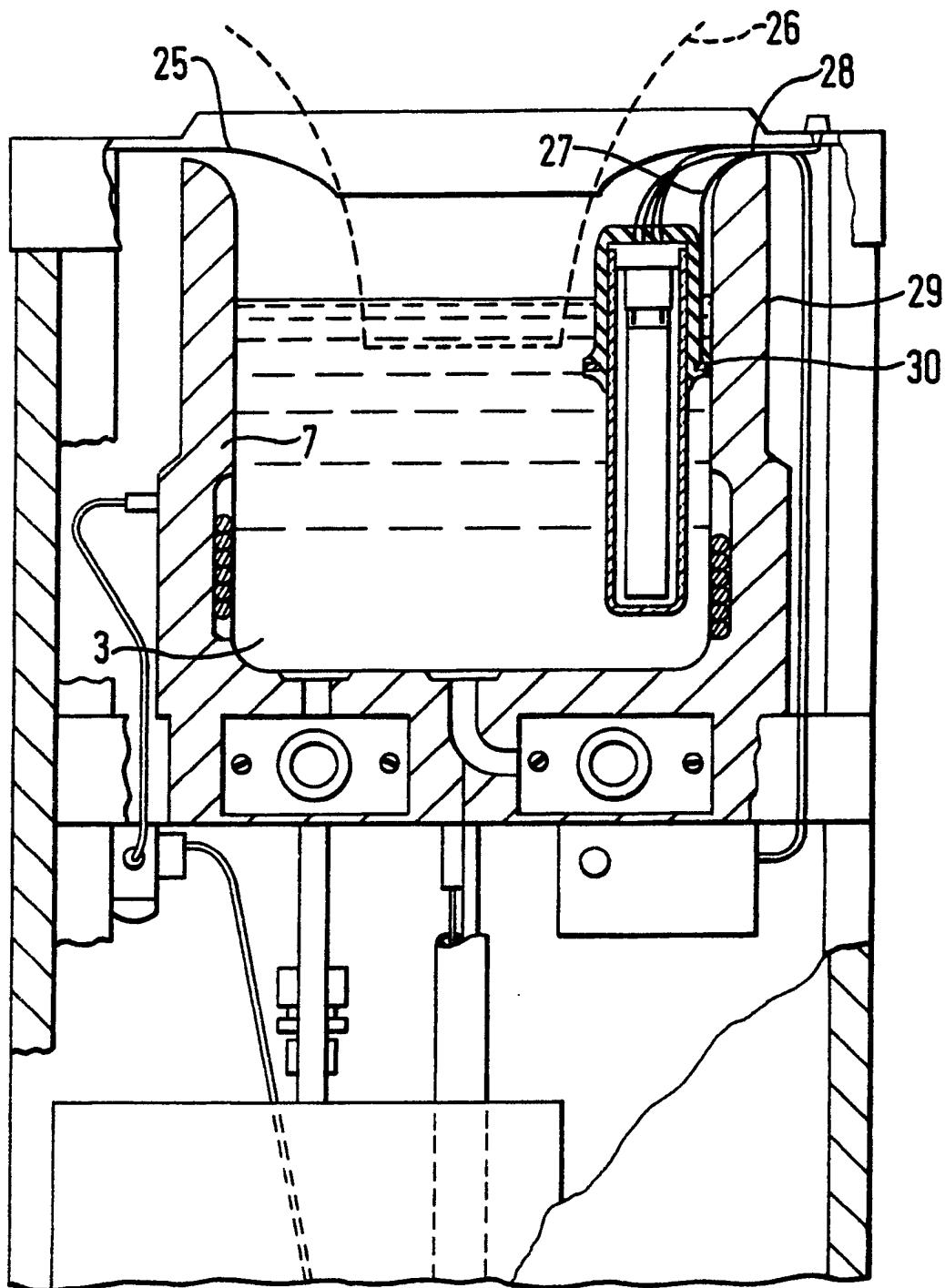


FIG. 4

METHOD OF STERILISING LIQUID IN A LIQUID DISPENSER

This invention relates to a method and apparatus for sterilising liquid held in a liquid dispenser such as a water dispenser.

Liquid dispensers for dispensing cooled liquids (particularly cooled water) for human consumption are well known. These generally have a water supply, a cooling chamber into which the water is supplied and a tap for dispensing cooled water from the cooling chamber. Water coolers have a removable transparent bottle containing the water to be dispensed. When exposed to light any bacteria present in the bottles multiply. As a bottle is often on a dispenser for up to a week, bacteria can reach unacceptably high levels. As the liquid is for human consumption it is important that bacteria and any other harmful micro-organisms be removed from the liquid prior to it being dispensed. Ultra violet light has been used in medical applications to sterilise water. Liquid coolers have also been produced which incorporate an ultra violet sterilisation system wherein liquid is pumped from the liquid supply through an sterilisation unit on the outside of the liquid dispenser. The sterilised liquid is then returned to the cooling chamber. This externally situated sterilisation system is very expensive and the liquid may be re-contaminated as it is pumped from the sterilisation assembly to the cooling chamber or as it is held within the cooling chamber until such a time as it is dispensed. The delay between sterilisation and dispensation in such a system may be significant, e.g. overnight, and therefore the likelihood of recontamination high.

The present invention provides a method of sterilising liquid in a liquid dispenser, the dispenser comprising a liquid supply into a cooling chamber from which cooled liquid is dispensed, the method comprising the step of sterilising the liquid in the cooling chamber.

The sterilisation of the liquid as it is being held in the cooling chamber reduces the chances of re-contamination considerably.

According to the invention in a second aspect there is provided a sterilisation assembly for insertion in the cooling chamber of a liquid dispenser, the assembly comprising an ultra violet lamp and means for holding the lamp within the cooling chamber.

The lamp of the invention may be readily mounted in the cooling chamber of a liquid dispenser and allows for efficient sterilisation of liquid contained therein whilst at the same time reducing the risk of re-contamination.

Two embodiments of the invention will now be described, by way of example, with reference to the accompanying drawings, in which;

FIG.1 is a cross section through a water cooler embodying the invention;

FIG. 2 is a cross section through the top end of the lamp of figure 1;

FIG. 3 is a cross section through the plug or grommet of figures 1 and 2; and

FIG. 4 is a cross section through a second embodiment of the invention.

Referring to figure 1, a water cooler 1 is shown and has funnel 2 for receiving the neck of a inverted water bottle. Water is supplied from the bottle to the cooling chamber 3 via a baffle plate arrangement 4 separating the two. The cooling chamber 3 is also provided with one way air vent 5 on its upper surface having a filter 6 therein. This lets air in as water is dispensed from the cooling chamber.

The cooling chamber 3 is formed from a steel casing 7 and has a tap 8 through which cooled water may be dispensed. A lamp assembly 9 is removably fixed to the baffle plate arrangement 4 and extends downwardly therefrom into the cooling chamber 3.

The lamp assembly 9 has an ultra violet light emitting bulb 10. Ultra violet light kills bacteria or micro-organisms onto which it is shone. Therefore when the light is on, any water contained within the cooling chamber 3 will be sterilised by the killing of the bacteria. The power of the bulb 10 is dependent on the flow rate of the tap 8. The bulb characteristics are selected so as to ensure that water flowing through the cooling chamber has sufficient intensity of ultra violet shone therethrough to adequately sterilise the water. The US Department of Health Standards for ultra violet sterilisation of water are a minimum of $16000 \text{ mW s}^{-1} \text{ cm}^{-2}$. The higher the tap flow

rate, the higher the required lamp power. For example, a water cooler having a tap 8 with a maximum possible flow rate of 2 gallons per minute and having a 15 watt ultra violet bulb should ensure a 99.9% bacteria and virus full of microorganisms causing, amongst other, Legionnaires disease, Cholera, Typhoid, Dysentery and E. Coli. The ultra violet bulb is enclosed within a crystal tube 15 having a closed lower end 16 and sealed at its upper end by a plastics end cap 17 which contains a socket assembly 18 for the bulb 10 and from which power supply cables 19 extend to a power supply and control unit.

The water cooler 1 is provided with a warning light 20 to indicate when the ultra violet bulb 10 has been switched on. This will be extinguished if the ultra violet bulb fails.

The lamp assembly 9 is secured to the baffle plate 4 by a plug or grommet 21 which sealably engages an aperture 22 in the baffle plate 9 and forms a seal between the surface of the lamp 9 and the edges of the baffle plate aperture 22. Neither water nor air can pass through this seal. The sealing plug 21 also prevents the ingress of contaminating material into the cooling chamber 3. The plug or grommet 21 is made of rubber or a similar resilient material. The inner diameter of the plug 21 is slightly smaller than the outer diameter of the lamp assembly 9 and the outer diameter of the plug 21 is slightly larger than the diameter of the baffle plate aperture 22. This allows the plug 21 to grip the lamp assembly 9 and engage the baffle plate 4, whilst at the same time allowing easy removal of the lamp assembly 9 from the baffle plate 4.

The ultra violet sterilisation assembly of the invention may be readily fitted to existing water coolers on modification of their baffle plates. This reduces the cost of modifying water coolers so as to incorporate means for sterilisation of the water prior to its being dispensed.

Referring to Figure 4 which shows an alternative embodiment of the invention, a water cooler 1 has a support member 25 for supporting the collar of an inverted water bottle 26 (shown in dotted outline) above a cooling chamber 3. The cooling chamber 3 has a steel casing 7 and a tap through which cooled water may be dispensed. A lamp assembly 9 is held within the cooling chamber 3 by a holding member 27 which is removably secured to the lamp assembly 9 and the cooling chamber 3. The lamp assembly 9 is of a similar construction to that described above.

The holding member 27 has a hooked portion 28 which may be hooked over the top of a side wall 29 of the cooling chamber 3 and a clip portion 30 having a ring defining an aperture for clipping around the lamp assembly 9. The lamp assembly 9 is secured within the clip portion 30 by a plug or grommet 21. The plug or grommet 21 is made of rubber or a similar resilient material and seals the upper portion of the lamp assembly 9 so as to protect the socket assembly 18 and bulb 10 from the water contained within the cooling chamber 3.

The resilient plug or grommet 21 and holding member 27 arrangement of Figure 4 allows one to securely hold the lamp assembly 9 whilst at the same time allowing easy removal of the lamp assembly 9 from the cooling chamber 3.

A further alternative means of holding the lamp assembly 9 within the cooling chamber 3 is to secure the lamp assembly 9 to the support member 25.

CLAIMS

1. A method of sterilising liquid in a liquid dispenser, the dispenser comprising a liquid supply into a cooling chamber from which cooled liquid is dispensed, the method comprising the step of sterilising the liquid in the cooling chamber.
2. A method according to claim 1 wherein the sterilising step comprises transmitting of ultra violet light through the liquid in the cooling chamber.
3. A method according to claim 1 wherein the liquid supply comprises an inverted bottle held above the cooling chamber and separated therefrom a baffle plate.
4. A dispenser for cooled liquid comprising a liquid supply to a cooling chamber, means for dispensing liquid from the cooling chamber and means for sterilising liquid in the cooling chamber.
5. A dispenser according to claim 4 wherein the sterilising means is a source of ultra violet light.
6. A dispenser according to claim 5 wherein the source of ultra violet light is an ultra violet lamp extending into the cooling chamber.
7. A dispenser according to claim 6 wherein one end of the lamp is secured within an aperture in a wall of the cooling chamber by a plug forming a seal between the surface of the lamp and the

edges of the apertures.

8. A dispenser substantially as herein described with reference to any of the figures 1 to 4.

9. A sterilisation assembly for insertion in the cooling chamber of a liquid dispenser, the assembly comprising an ultra violet lamp and means for holding the lamp within the cooling chamber.

10. A sterilisation assembly according to claim 9 wherein the holding means comprises a resilient plug for holding one end of the lamp within an aperture in a wall of the cooling chamber and forming a seal between the edges of the aperture and the surface of the lamp held within the plug.

11. A sterilisation assembly according to claim 10 wherein the wall of the cooling chamber to which the lamp may be secured is a baffle plate separating the cooling chamber from a liquid supply.

12. A sterilisation assembly according to claim 11 wherein the baffle plate is removable.

13. A sterilisation assembly according to claim 9 wherein the holding means comprises means for securing the lamp assembly to a wall of the cooling chamber.

14. A sterilisation assembly accordingly to claim 13 wherein the securing means includes a hooked portion for engaging the

top of a side wall of the cooling chamber and a clip portion for holding the lamp assembly.

15. A sterilisation assembly according to claim 14 wherein, in use, the clip portion engages a resilient grommet which grips the lamp assembly.

16. A sterilisation assembly substantially as herein described with reference to any of figures 1 to 4.

Application number

GB 9405158.8

Search Examiner
R HONEYWOOD

Date of completion of Search

Documents considered relevant
following a search in respect of
Claims :-
1-16

(ii) ONLINE DATABASE - WPI

Categories of documents

- X: Document indicating lack of novelty or of inventive step.
- Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.
- A: Document indicating technological background and/or state of the art.
- P: Document published on or after the declared priority date but before the filing date of the present application.
- E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.
- &: Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages	Relevant to claim(s)
A	EP 0202839 A2 (STILL & SONS LTD)	1 and 9 at least
A	WPI Accession Number. 87-206682/30 & DD 243688 (VEB SCHIEN STAMMBET) see abstract	1 and 9 at least

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).

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DERWENT-WEEK: 199549

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TITLE: Sterilising cooled water held in cooler with dispensing tap using UV lamp mounted in water in cooling chamber

INVENTOR: WARD B J

PATENT-ASSIGNEE: WARD B J[WARDI]

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GB 2289045 A	November 8, 1995	EN

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INT-CL-CURRENT:

TYPE	IPC DATE
CIPS	C02F1/32 20060101

ABSTRACTED-PUB-NO: GB 2289045 A

BASIC-ABSTRACT:

Dispenser for cooled liquid comprises a liquid supply to a cooling chamber (3), a tap (8) for dispensing the liquid from the chamber, and a UV lamp (9) for sterilising liquid in the cooling chamber. Also claimed is a sterilisation assembly for mounting in a water cooler including a means for holding the UV lamp.

The cooler pref. has a funnel (2) for receiving the neck of an inverted water bottle. The water is supplied via a baffle plate (4) which separates the funnel and the cooling chamber (3). An air vent (5) with a filter (6) lets air in as water is dispensed from the chamber via a tap (8). The lamp assembly (9) has a UV light emitting bulb (10). It is removably fixed to the baffle plate (4) and extends downwardly into the chamber. Activation of the lamp kills bacteria or microorganisms onto which the UV light is directed.

USE - The dispenser is used esp. for sterilising water held in a cooler for dispensing for drinking.

ADVANTAGE - The lamp is easily mounted in the cooling chamber giving efficient sterilisation of the water and reducing the risk of recontamination.

CHOSEN-DRAWING: Dwg.1/4

**TITLE-TERMS: STERILE COOLING WATER HELD
DISPENSE TAP ULTRAVIOLET
LAMP MOUNT CHAMBER**

DERWENT-CLASS: D15 D22

CPI-CODES: D04-A02; D09-A;

SECONDARY-ACC-NO:

CPI Secondary Accession Numbers: 1995-162679